What is claimed is:

1. An electric power steering system causing an electric motor to generate a steering assist force according to a steering torque, comprising:

a torque sensor for detecting the steering torque;

phase compensation means acting when a target control value of the electric motor is generated based on an output from the torque sensor; and

means for varying the characteristics of the phase compensation means depending upon whether a steering mode is steer with driving or steer without driving.

2. An electric power steering system according to Claim 1, wherein the phase compensation means includes a first phase compensator for steer with driving and a second phase compensator for steer without driving, and

wherein the means for varying the characteristics of the phase compensation means comprises means for making changeover of the phase compensators in order that the target control value is generated by means of the first phase compensator in the case of steer with driving and that the target control value is generated by means of the second phase compensator in the case of steer without driving.

3. An electric power steering system according to Claim 1, wherein the phase compensation means includes

a first phase compensator dedicated to steer with driving and arranged to have a damping peak at a predetermined frequency, and a second phase compensator dedicated to steer without driving and arranged to have a damping peak at a predetermined frequency, and

wherein the damping peak of the second phase compensator is on a lower frequency side than the damping peak of the first phase compensator.

4. An electric power steering system according to Claim 1, wherein the phase compensation means is represented by a transfer function $G_C(s)$ of the following formula, and parameters ζ_2 and ω_2 of the transfer function $G_C(s)$ are set to values to reduce or cancel a peak of a gain characteristic of an open-loop transfer function for torque of the electric power steering system, the peak appearing based on natural vibrations of a mechanical system and a counter-electromotive force of the motor:

$G_C(s)=(s^2+2\zeta_2\omega_2 s+\omega_2^2)/(s^2+2\zeta_1\omega_1 s+\omega_1^2)$,

where ζ_1 denotes a compensated damping coefficient; ζ_2 denotes a damping coefficient of a compensated system; ω_1 denotes a compensated natural angular frequency; and ω_2 denotes a natural angular frequency of the compensated system, all these symbols representing the parameters of the function $G_C(s)$.